# Zero Retries issue 0102 2023-06-09

***Zero Retries is an independent newsletter promoting technological innovation in Amateur Radio, and Amateur Radio as (literally) a license to experiment with radio technology.***

**About Zero Retries**

## Steve Stroh N8GNJ, Editor

**Jack Stroh, Late Night Assistant Editor Emeritus**

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**Web version of this issue - https://www.zeroretries.org/p/zero-retries-0102**

### Request To Send

*Editorial by Steve Stroh N8GNJ*

This week is sandwiched between our return from SEA-PAC and a major event at our household in ten days, and significant preparations for that event. Compensating mightily for that time crunch is some of the nicest Western Washington weather I can remember for early June - sunny, dry, slight breeze, and temps in the 70s. This weather is as close to heaven as I can imagine. Somehow… (we are blessed!) the smoke from wildfires in British Columbia has not come South (yet).

Thus as I put together another issue without much time for editing, this quote from Mark Twain comes to mind:

> I didn't have time to write a short letter, so I wrote a long one instead.

Thus the same note applies - this issue *will* overflow your mailer, so just go to the web page for this issue.

And, sadly, *still* not enough time to follow up on comments and email feedback here in Zero Retries. My apologies folks!

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### SEA-PAC 2023

By Steve Stroh N8GNJ

*There weren't any stunning Zero Retries Interesting developments to report from SEA-PAC 2023 in Seaside, Oregon this past weekend, but there was a fair amount of "Zero Retries Interesting".*

The Icom IC-905 is now real enough that it's no longer being isolated "under glass" in the Icom booth, and I actually got to do some button-poking on the demo unit.

While I have a few quibbles about Icom's choice of features such as FSTV (Analog Amateur Television) rather than Digital Amateur Television, Digital Data (DD) mode (128 kbps) hasn't been improved for two decades now aside… credit where due. Icom conceived, *and is now shipping*, a new paradigm in Amateur Radio with the IC-905 as an integrated unit that combines 144 / 440 / 1200 / 2300 / 5600 MHz capability. I think that eventually, I'll have to invest in one to thank Icom for making such significant investment in Amateur Radio's VHF, UHF, and microwave bands. Hopefully, with Icom's demonstration of a market for such a radio, the IC-905 will be the first of a number of such units.

I enjoyed browsing the FlexRadio booth and dreaming a bit, and of course, putting in my usual plea for a FlexRadio unit with native VHF / UHF capability. I don't think I actually said "If Icom can do it…", but I was certainly thinking it.

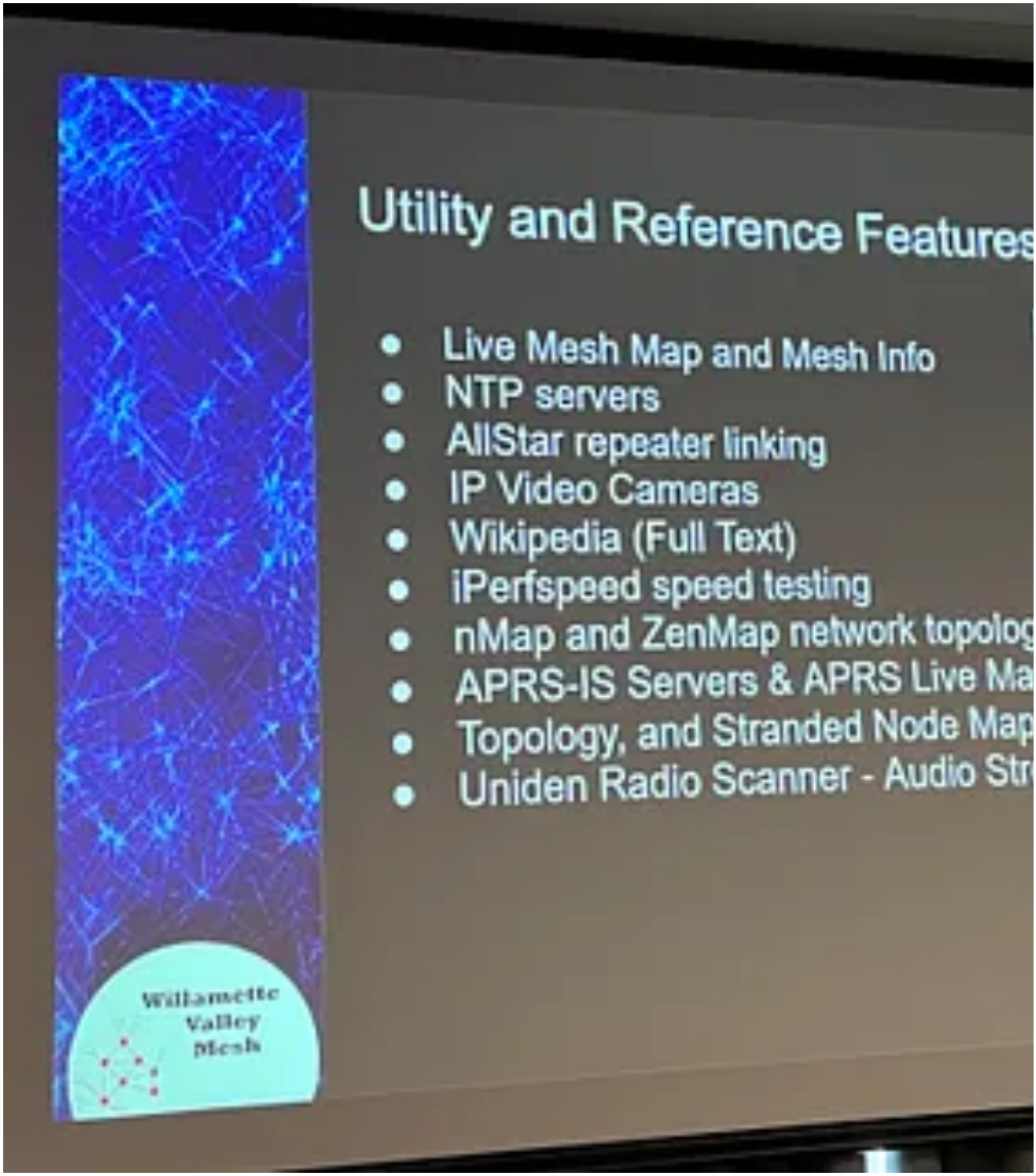
Later, in sitting through the FlexRadio's seminar, I had a mini-revelation that Icom (and most other manufacturers of high-end Amateur Radio units) just haven't quite made the transition into to the era of Software Defined Radio (SDR). FlexRadio *does get SDR*; FlexRadio builds their hardware in service to the software. Icom and the others, on the other hand, regard software as in service to the hardware.

Icom seems to view software as a way to fix bugs, where FlexRadio views software as a way to *add features*. To FlexRadio, most of the product *is the software*[1].

At least, that's the way it seems to me.

Nick Lekas KK7DLH - SEA-PAC 2023 Photo by Steve Stroh N8GNJ

The *most* interesting thing I saw, and discussion I had at SEA-PAC was a model of OreSat0, ably explained by Nick Lekas KK7DLH of Portland State University who answered my questions with considerable depth of knowledge, including PSU's planned follow-on satellites. I can't explain *how refreshing that conversation with KK7DLH was…* in an entire convention center filled with "Same Old, Same Old" Amateur Radio.




Willamette Valley Mesh presentation - SEA-PAC 2023 Photo by Steve Stroh N8GNJ

Second to my conversation with KK7DLH was an interesting ad-hoc presentation (the scheduled presenter couldn't make it to SEA-PAC 2023) from two representatives (unfortunately I didn't record their names) of Willamette Valley Mesh Network. Wow… that is *quite* a network, and what impressed me most was the wide range of services / servers that are accessible *on* the network. A few of the coolest services mentioned were a seismograph, a lightning detector, and a Citadel BBS.

ARDC booth - SEA-PAC 2023 Photo by Steve Stroh N8GNJ

It was fun to check in with Rosy Schecter KJ7RYV, ARDC's Executive Director and old friend John Hays K7VE, ARDC's Outreach Director at ARDC's booth. There was a notebook with an update about MIT's Big Dish refurbishment project (apparently, the refurbishment is mostly complete2), which triggered my usual plaint to KJ7RYV that to date, ARDC isn't doing a very good job of following up to the public about the outcomes of ARDC's grants - such as the *$1.6M grant to MIT*3. KJ7RYV said that she understood my plaint, and hopefully ARDC will do better in the future with a new Communications Director (to be determined - soon).

Vectronics VEC-1770C purchased at SEA-PAC 2023 Photo by Steve Stroh N8GNJ

Lastly, of course I made the rounds of the flea market tables at SEA-PAC and my best acquisition was a new old stock Vectronics4 VEC-1770C Terminal Node Controller (TNC). This is the same unit as an MFJ 1270C, based on the TAPR TNC-2. The VEC-1770C is "brand new", all still in original wrappings… just decades old now. I haggled a bit and bought it for $20. The VEC-1770C is destined for the "Living Packet Radio Project and Museum" (still in the planning stages) here at N8GNJ Labs.

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### Thoughts on Amateur Radio Adjacent Technologies - LoRa

By Steve Stroh N8GNJ

*Amateur Radio isn't the only "hobby / experimenter" route to learning about radio technology. LoRa has become a very popular entry point to radio technology experimentation, but such alternatives aren't being recognized in Amateur Radio.*

I had a conversation at SEA-PAC 2023 that surprised me. I was talking to a very knowledgeable Amateur Radio Operator, and I mentioned that young techies that are experimenting with radio technology are increasingly using LoRa technology to build mesh networks in lieu of getting an Amateur Radio license and experimenting within Amateur Radio.

*To my surprise, this knowledgeable Amateur Radio Operator said that they had not heard of LoRa or creating mesh networks out of LoRa nodes.*

While LoRa isn't "Amateur Radio" technology, it is fast becoming the defacto technology for techies that want to experiment with data communications over radio. There are good reasons to choose LoRa:

- It's inexpensive5,
- It's natively data communications - no analog radio + modem is needed,
- It's pretty easy to get started,
- It doesn't require a license as LoRa units are available for the US license-exempt 902-928 MHz band6,
- Because there's no Amateur Radio license involved, there are no issues about "appropriate content", encryption, etc.,
- It works - the Chirp Spread Spectrum modulation is robust, and interference / contention doesn't seem to be an issue,
- There's ample support, documentation, inspiration, etc. for experimentation, including from hobby / maker vendors such as Adafruit and SparkFun Electronics,
- There's ample peer-to-peer support, especially if you have a friend within a mile or so.

But as the knowledgeable Amateur Radio Operator illustrated, there's a significant "blind spot" in Amateur Radio about technologies such as LoRa and especially how they're "competing" for the attention of those who are technically curious.

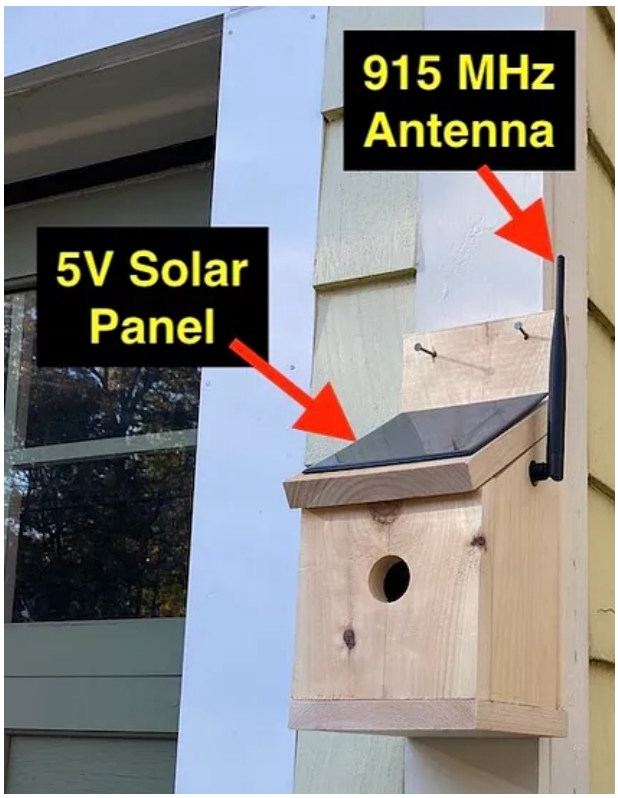


Image courtesy of WARS LoRa Birdhouse Project

*For example, I just read about the WARS LoRa Birdhouse Project which is an admirable project in putting together a public mesh network based on LoRa, but the project's principals are woefully misinformed about the realities of the 902-928 MHz band:*

> *The 33cm ham band (902-928 MHz) is used given that this is an experimental technology. All nodes must be installed/operated by FCC licensed amateur/ham radio operators.*

*Thus the developers of this network are excluding techies who might be interested in experimenting with radio technology, but are not Amateur Radio Operators. That's… unfortunate… and shortsighted, in my opinion.*

*To be clear, 902-928 MHz can be used by anyone using license-exempt devices under FCC Part 15 regulations (low power, etc.). The builders of the WARS LoRa Birdhouse Project are certainly within their rights in operating their network to require an Amateur Radio license… but an Amateur Radio license is not required to use 902-928 MHz. For example, even mighty Motorola Solutions takes advantage of 902-928 MHz being license-exempt with their DTR 620 portable radio.*

***Update 2023-10-20***

My thanks (and apologies) to Bruce MacKinnon KC1FSZ, the creator of the WARS LoRa Birdhouse Project, for an exchange of graceful emails pointing out some errors on my part in the above four paragraphs (now denoted in italics).

***My apologies to Bruce MacKinnon KC1FSZ - he was not "woefully misinformed".***

One error on my part was that in reading KC1FSZ's statement:

> All nodes must be installed/operated by FCC licensed amateur/ham radio operators.

I created an *inferred* statement in my mind of:

All nodes **operating in 902 - 928 MHz** must be installed/operated by FCC licensed amateur/ham radio operators.

That *isn't* what KC1FSZ said, nor what he meant.

That became clear upon re-reading the project's GitHub page more thoroughly, and noticed this explanation:

> Do I Need To Be A Ham To Use The Network?
>
> Yes. The radio module we are using is not Part 15 certified so it must be run using Part 97 (amateur) rules. We are currently doing research on a non-ham ISM Part 15 version of the network to make it easy for non-licensed users to join the fun.

Not seeing that in my initial reading was another error on my part.

As I explained to KC1FSZ in our email exchange, I was reasonably sure that the radio module used in the project would have FCC Part 15 certification as it's a product of Semtech (a reputable manufacturer). But, I was incorrect - the module in question is *not* Part 15 certified. While the module in question is designed to be fully compliant with the FCC Part 15 regulations, it's intended to be *embedded into products*, (not a complete system by itself). Thus the eventual *product*, incorporating the radio module, would have to be FCC Part 15 certified before it can be offered for sale (which would be usable by anyone).

KC1FSZ, using that module in a system intended to be used by Amateur Radio Operators, in Amateur Radio spectrum (see below), within the FCC Part 97 rules, does not require that the module be certified.

That's because of the quirk of spectrum policy in the US that 902-928 MHz is simultaneously:

- One of the Industrial, Scientific and Medical (ISM) bands where (Part 15 certified) devices can be operated by anyone, *and*
- *Also* the Amateur Radio 33cm band. Thus Amateur Radio Operators can use equipment intended for Part 15 operation, outside the limits imposed by Part 15 (low power levels, etc.).

I'll also note that KC1FSZ, in specifying that only Amateur Radio Operators can build and operate a node (incorporating the module in question), KC1FSZ is adhering scrupulously to the FCC rules. Most hobbyist (and some commercial) users of such modules aren't that scrupulous and use such radio modules with no concern for the legalities.

**(End of Update 2023-10-20)**

A second example of experimenting with radio technology apart from Amateur Radio is the rising popularity of General Mobile Radio Service (GMRS) which provides most of the "voice chatting on an Amateur Radio UHF repeater" experience… without Amateur Radio. Granted that the "experimentation" is mostly social, as in talking via (wide area) radio. Yes, it's understood that a GMRS license is required, but that's easily accomplished for $35 and a few minutes of time at the FCC website. Using GMRS does not require studying in order to answer arcane7 technical and regulatory questions, or having to understand Amateur Radio culture to be comfortable talking on a repeater.

A third example is SatNOGS - an "Open Source global network of satellite ground-stations". Because a SatNOGS station is receive-only, no Amateur Radio (or other) license is required. But building a SatNOGS station is a great project for curious techies for experimenting with radio technology. TinyGS is much the same as SatNOGS; it fuses LoRa and a simplified receive-only ground station to receive LoRa telemetry transmissions from experimental satellites.

In conclusion, much like operating Citizen's Band equipment in the 1970s exposed many people to the fun of experimenting (and socializing) with radio which became a pathway to Amateur Radio, in *this* era, LoRa, CBRS, and SatNOGS can be similar pathways to Amateur Radio…

*… but only if Amateur Radio is cognizant of those technologies / systems and provide a welcoming environment to those experimenting with radio technology.*

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## Jeff Geerling (of Raspberry Pi Fame) is now KF0MYB

By Steve Stroh N8GNJ

*Jeff Geerling - a prominent YouTuber specializing in interesting Raspberry Pi projects, just got his Amateur Radio license.*

With a modest post on Mastodon:

> I am a ham.

Jeff Geerling announced his interest in Amateur Radio. I've been a fan of Geerling for some time, so I immediately fired off an email:

> With as much enthusiasm as this…

> *You are **most welcome** (to Amateur Radio)!!!*
>
> There are some few of us that have been trying to welcome the Makers, techies, and students into Amateur Radio, trying to represent Amateur Radio in ways that appeal and interest those communities. There have been some successes, but it's slow going.
>
> Thus, you, with your vast legions of followers, and your standing in the RPi community, are Most Welcome!

Jeff Geerling KF0MYB is a prominent YouTube creator (497k subscribers, 379 videos) who offers interesting, sometimes bleeding-edge Raspberry Pi computing projects such as The Petabyte Pi Project. Most recently KF0MYB scored an exclusive interview (face to face… *in the UK*) with Eben Upton of Raspberry Pi about the near-term future of the Raspberry Pi. KF0MYB also offered an interesting look at the manufacturing of Raspberry Pi units in a Sony factory in the UK.

Per our email exchange, KF0MYB plans to "take it slow" for perhaps the next year in getting up to speed within Amateur Radio. However, I'm guessing "Red Shirt Jeff"8 won't take things quite so slow, particularly after I start (gently) spamming him with references to interesting Amateur Radio projects based on Raspberry Pi units. Not to mention having a bit of space for Amateur Radio in his new studio / lab.

There is also the influence of his Dad Joe, a Broadcast Engineer, who is now KF0MYJ. For adventures with KF0MYJ, Geering has a second channel called Geerling Engineering.

KF0MYB is a gifted video communicator… and all-around smart person and an inspiration (he's had his share of challenges). If / when KF0MYB offers his take on Amateur Radio to his legions of YouTube followers, I suspect it will motivate a significant number of them to similarly take the plunge into Amateur Radio. Those folks also will be *Most welcome !!!* into Amateur Radio.

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## ZR > BEACON

By Steve Stroh N8GNJ

*Short mentions of Zero Retries Interesting items*.

### Amateur Radio Daily

I'm remiss in taking so long to feature **Amateur Radio Daily** before now. With Amateur Radio Daily, Cale Mooth K4HCK decided to fill the void left by the transition to Silent Keyboard of Richard Brunton G4TUT who so ably produced Southgate Amateur Radio News for many years. Unlike Amateur Radio Weekly (K4HCK's original project), Amateur Radio Daily is only available via RSS or web page.

**Recommended** - I'm certainly enjoying Amateur Radio Daily in my Amateur Radio RSS feed.

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### DQRM RFP Project

> The Northern California DX Foundation recognizes the negative aspect deliberate QRMers are having on our hobby. We believe this is a problem that can be mitigated by applying amateur operators' vast knowledge and receiving tools to good use. In order to spur research into solving the problem the NCDXF Board of Director's at their latest Board meeting allocated $100,000 to help develop solutions.
>
> NCDXF will entertain grant proposals from individuals and/or groups that specifically outline their approach to identify bad actors. A group of directors led by Craig Thompson (K9CT) and Don Greenbaum (N1DG) will weigh the probability of success of these proposals as well as monitor the progress of the grantees.

Two things that spring immediately to mind are increased use of data modes (it's not nearly as fun to try to interfere with a will-patiently-retry data

transmission) and applying the capabilities of multiple, geographically dispersed KrakenSDR units for fully automatic triangulation. Given that the lowest (native) receive frequency of the KrakenSDR is 24 MHz, some development work will be needed to automatically triangulate HF signals. Also, there will need to be some development of appropriate inexpensive (you'll need five) directional HF antennas.

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**Crucible of Communications: How amateur radio launched the information age and brought high tech to life**

**Part 1: The birth and breadth of the ham radio hobby**

Interesting article the 2022-10 issue of IEEE Communications Magazine by Theodore Rappaport N9NB:

> Abstract: The hobby of amateur radio, or "ham radio" as it is commonly known among its 3 million global practitioners, has been at the vanguard of electrical and computer engineering since a young Italian inventor, Guglielmo Marconi, first demonstrated wireless at his summer home in Bologna in 1894. Ever since that fateful discovery, amateur radio has played vast and vital roles in capturing the imagination of inventors, spawning new technologies, fueling the global engineering work force, and fostering friendship and international goodwill. This three-part series of articles chronicles the historical evolution of amateur radio, and shows the astounding impact that the ham radio hobby has made on both the engineering profession and the world.
>
> …
>
> Part 2 of this series will delve into the history of how universities facilitated amateur radio on their campuses to build up a major arsenal of technical experts who went on to develop the global radio broadcast industries, long-distance telephone, television, stereo, the walkie-talkie, and radar.
>
> Part 3, the final installment in this series, will offer a historical account of how amateur radio operators began learning about VHF and UHF frequencies, where they created nationwide repeater systems, often with touch-tone telephone capabilities, thereby proving the concepts and creating the global engineering talent pool needed for the fledgling cellular telephone industry.

While these articles explain past technological innovation in Amateur Radio very well, I posit here in Zero Retries every week that technological innovation in Amateur Radio is not only still occurring, it's *accelerating*. The reason that it's not quite so noticeable to the public *in this era* is that unlike previous eras, radio technology is now ubiquitous. *Everyone* now uses radio technology in their daily lives via wide area wireless networks, local wireless networks, and pico wireless networks.

I look forward to also reading the latter two installments. This premise reminds me of the book Ham Radio's Technical Culture, published in 2006.

*Readers - A favor to ask - would a member of IEEE ComSoc who receives Communications keep an eye out for Part 2 and Part 3 of this series? From what little I can see as a non-subscriber, they have not been published yet.*

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**Digital Library of Amateur Radio & Communications Item Count - now 75,000+**

There's a lot to be proud of here, but this was the coolest part, from my perspective:

> DLARC is adding newsletters from amateur radio groups around the world: the latest additions include 1,400 news bulletins from Irish Radio Transmitters Society going back to 1998, and more than 600 newsletters from the Worldwide TV-FM DX Association, a hobby club devoted to long-distance television and FM communications. The library has also added newsletters from regional groups across the United States, including the Anchorage (Alaska) Amateur Radio Club, Indianapolis (Indiana) Radio Club, the Pikes Peak (Colorado Springs, Colorado) Radio Amateur Association, and a dozen other organizations. Many of these newsletters have never been posted to the Internet before. All are full-text searchable, and can be read online or downloaded.

Unpack that a bit - many of these *have never been online, let alone full-text searchable!*

In my opinion, Kay Savetz K6KJN is just doing a *phenomenal* job finding and archiving these gems for DLARC. From personal experience, K6KJN is very easy to work with in arranging donations of your Amateur Radio material to DLARC.

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## Join the *Fun* on Amateur Radio

If you're not yet licensed as an Amateur Radio Operator, and would like to join the fun by *literally having a license to experiment with radio technology*, check out
**Join the Fun on Amateur Radio** for some pointers.

**Zero Retries Frequently Asked Questions (FAQs)** — In development 2023-02.

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## Closing the Channel

In its mission to highlight technological innovation in Amateur Radio, promote Amateur Radio to techies as a literal license to experiment with radio technology, and make Amateur Radio more relevant to society in the 2020s and beyond, Zero Retries is published via email and web, and is available to everyone at no cost. Zero Retries is proud *not to participate* in the Amateur Radio Publishing Industrial Complex, which hides Amateur Radio content behind paywalls.

My ongoing ***Thanks*** to:

- Tina Stroh KD7WSF for, well, *everything!*
- **Pseudostaffers** that write about about "Zero Retries Interesting" items on their blogs that I don't spot:

    - Dan Romanchik KB6NU
    - Jeff Davis KE9V
- **Newsletters** that regularly feature Zero Retries Interesting content:
    - Amateur Radio Weekly by Cale Mooth K4HCK is a weekly anthology of links to interesting Amateur Radio stories.
    - Experimental Radio News by Bennet Z. Kobb AK4AV discusses (in detail) Experimental (Part 5) licenses issued by the US FCC.
    - TAPR Packet Status Register has been published continuously since 1982.
    - Other Substack Amateur Radio newsletters recommended by Zero Retries.
- **YouTube channels** that regularly feature Zero Retries Interesting content:
    - HB9BLA Wireless by Andreas Spiess HB9BLA
    - KM6LYW Radio by Craig Lamparter KM6LYW (home of the DigiPi project)
    - Modern Ham by Billy Penley KN4MKB
    - Tech Minds by Matthew Miller M0DQW
- The Substack email publishing platform makes Zero Retries possible. I recommend it for publishing newsletters.

If you're reading this issue on the web and you'd like to see Zero Retries in your email Inbox every Friday afternoon, just click below to join ~~100~~ ~~200~~ ~~300~~ ~~400~~ *500* ~~600~~ ~~700~~ *800+* other readers:

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If you're a fellow smart person that uses **RSS**, there *is* an **RSS feed for Zero Retries**.

**Zero Retries (N8GNJ) is on Mastodon** — n8gnj@mastodon.radio — just click:

Zero Retries / N8GNJ on Mastodon

Email issues of Zero Retries are "instrumented" by Substack to gather basic statistics about opens, clicking links, etc.

More bits from Steve Stroh N8GNJ:

- SuperPacket blog — *Discussing new generations of Amateur Radio Data Communications — beyond Packet Radio (a precursor to Zero Retries)*
- N8GNJ blog — *Amateur Radio Station N8GNJ and the mad science experiments at N8GNJ Labs — Bellingham, Washington, USA*

Thanks for reading!
Steve Stroh N8GNJ / WRPS598 (He / Him / His)
These bits were handcrafted (by a mere human, not an Artificial Intelligence bot) in beautiful Bellingham (The City of Subdued Excitement), Washington, USA.

2023-06-08

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1

If you think this focus on software as the product is overblown, perhaps take a lesson from Jim Farley, the CEO of Ford in this recent interview about how Ford has to *start from scratch* in building a coherent software framework for their battery electric vehicles. This is a… "significant"… departure from previous practice of each vehicle having 150 varied electronics modules from subcontractors… all running their own unique software, all of that module software *untouchable* by Ford because the module's software is the intellectual property of the subcontractors.

2

In the truest spirit of Engineering, none of those bright engineering students at W1MX wants to do the grunt work of documentation such as updating the website - last updated in 2021.

[3]

One would think that if there was one grant that rated a public followup, that $1.6M grant would be one. But, nothing heard (to the public). Per that notebook page on display, apparently there was some private followup to ARDC.

[4]

I have never figured out the rationale for MFJ to maintain the separate Vectronics brand with identical (other than the model number) products between the two brands.

[5]

I've heard the "*Must* be cheap to experiment" factor cited numerous times in talking to young techies, and especially students. For young techies and students, the primary mantra for their choices are "cheap, Cheap, and CHEAP".

[6]

In Europe, 433 MHz is a license-exempt band. In the US, license-exempt use of 433 MHz is allowed for very low-power devices, but otherwise is semi-exclusive to Amateur Radio. Thus LoRa can be used for experimentation under Amateur Radio regulations, including higher power than license-exempt units, but there is still the "encryption" issue.

[7]

Those of us who have our Amateur Radio license… and many techies, don't regard an Amateur Radio license examination as onerous… but to many, it is a daunting process.

[8]

For those who aren't hard core Star Trek fans, here's an explanation about the significance of "Red Shirts". In the context of Geerling's YouTube videos, he often blames "Red Shirt Jeff" for particularly funny blunders or when he envisions an interesting *(You did… what???)* experiment , such as cutting the connectors off a Raspberry Pi.